Pregnancy-related pain in the pelvis (PPP): Terminology, clinical presentation and prevalence

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REVIEW

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Pregnancy-related pelvic girdle pain (PPP), I: Terminology, clinical presentation, and prevalence

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Abstract Pregnancy-related lumbopelvic pain has puzzled medicine for a long time. The present systematic review focuses on terminology, clinical presentation, and prevalence. Numerous terms are used, as if they indicated one and the same entity. We propose "pregnancy-related pelvic girdle pain (PPP)", and "pregnancy-related low back pain (PLBP)", present evidence that the two add up to "lumbopelvic pain", and show that they are distinct entities (although underlying mechanisms may be similar). Average pain intensity during pregnancy is 50 mm on a visual analogue scale; postpartum, pain is less. During pregnancy, serious pain occurs in about 25%, and severe disability in about 8% of patients. After pregnancy, problems are serious in about 7%. The mechanisms behind disabilities remain unclear, and constitute an important research priority. Changes in muscle activity, unusual perceptions of the leg when moving it, and altered motor coordination were observed but remain poorly understood. Published prevalence for PPP and/or PLBP varies widely. Quantitative analysis was used to explain the differences. Overall, about 45% of all pregnant women and 25% of all women postpartum suffer from PPP and/or PLBP. These values decrease by about 20% if one excludes mild complaints. Strenuous work, previous low back pain, and previous PPP and/or PLBP are risk factors, and the inclusion/exclusion of high-risk subgroups influences prevalence. Of all patients, about one-half have PPP, one-third PLBP, and one-sixth both conditions combined. Overall, the literature reveals that PPP deserves serious attention from the clinical and research communities, at all times and in all countries.

Keywords Pregnancy · Pelvic girdle · Low back pain · Prevalence · Review

Introduction

Pregnancy-related lumbopelvic pain has puzzled medicine for a long time. More than 2,000 years ago, Hippocrates (c. 460–c. 377 B.C.) theorised that an irreversible relaxation and widening of the pelvis occurs with the first pregnancy [50], the resultant instability of the sacroiliac joints leading to symptomatic inflammation [94].

Recent literature suggests that around half of all pregnant women incur lumbopelvic pain [7, 31, 35, 62,

78, 113], which may persist, or arise, after delivery [67], and will, in some patients, lead to severe disability [28, 31, 33, 56, 67, 82, 113]. Unfortunately, much remains unclear. Consensus on terminology is lacking, and it is uncertain that all the terms used refer to the same pathological entity [3, 74]. Moreover, published prevalence figures vary widely; underlying pathological mechanisms are still a matter of debate, and there is no unanimity in the literature as to diagnosis and treatment.

So far, two systematic reviews have been published, one on workload during pregnancy [89], and one on the treatment of pregnancy-related lumbopelvic pain [117]. However, to better understand prevalence, pathology, diagnosis, treatment, and the relationships between them, one would need comprehensive reviews that cover all relevant aspects. Several attempts have been made to present a comprehensive review [39, 41, 46, 55, 79, 91, 94]. These reviews, however, did not use systematic strategies to search the literature. Furthermore, new interesting findings have been published that may affect our understanding of the problems [23, 68, 87, 116].

The importance of this topic, both to the individual patient and to society at large, the lack of systematic reviews that cover the whole area of pregnancy-related lumbopelvic pain, and the potential relevance of new findings, warrant, in our opinion, a comprehensive review based upon a systematic search of the literature. The present paper aims at being the first part of such a comprehensive review, covering terminology, clinical presentation, and prevalence. We address pathology, diagnosis, and treatment in a later part.

Search method

We searched for relevant literature on MEDLINE from 1966 through September 2002. We used a large number of search terms (Table 1) and limited our initial search to English papers. This resulted in 791 titles. Two of us (W.H.W. and K.U.) independently judged the possible relevance of these titles. In 116 cases, they agreed that the paper in question should be part of the stock; in 629 cases they agreed that it should not, and in 46 cases there was disagreement, or doubt for at least one of them ($\kappa = 0.80$, "good" reliability [4]). Differences of opinion were resolved in open discussion.

Papers were collected where possible (we failed to locate three) and classified by one of us (W.H.W.) into terminology, clinical presentation, prevalence, risk factors, pathology, diagnosis, and treatment. Of course, any paper could belong to more than one category. All papers thus collected were studied, their lists of references inspected, and further relevant papers collected. We discarded papers that failed to give any original information. For the present first part of our review, this resulted in a total stock of 106 papers.

Terminology

A large number of terms (Table 2) have been used to indicate pregnancy-related lumbopelvic pain. A major problem is that many terms in the literature hint at a pathological mechanism—"relaxation", "arthropathy", or "instability"—while, in fact, pathological mechanisms remain obscure [74, 88, 92]. The term "insufficiency" (or *insufficientia*) suggests that something vital is lacking that prevents the pelvic girdle and/or the spine from functioning properly, but this fails to add to our understanding. At present, it would be wise to omit any reference to pathology and simply focus on the defining symptom—pain.

Östgaard [85] proposed "posterior pelvic pain" to denote problems that are distinct from back pain in pregnancy. A special test to diagnose posterior pelvic pain [84] was reported to have high sensitivity and specificity. Moreover, Endresen [28] found a different pattern of statistical associations for pregnancy-related low back pain vs pelvic pain: contrary to low back pain in pregnancy, the prevalence of pelvic pain in pregnancy was found to be higher in second and later pregnancies. Norén et al. [75] reported that women with pelvic pain had greater functional impairments than those with lumbar pain, and women with a combination of both types of pain were more severely disabled than either of the two groups. Finally, in a randomised clinical trial, individual back school treatment resulted in a significant lowering of sick-leave frequency in patients with low

Table 1 Search terms plus Boolean operators we used in MEDLINE

(Back pain, backache, low back pain, lumbago, pelvic arthropathy, pelvic girdle loosening, pelvic girdle relaxation, pelvic instability, pelvic insufficiency, pelvic joint dysfunction, pelvic joint instability, pelvic joint subluxation, pelvic joint syndrome, pelvic loosening, pelvic osteoarthropathy, pelvic pain, pelvic relaxation, pelvic subluxation, peripartum pelvic pain, posterior pelvic pain, sacroiliac joint dysfunction, sacroiliac joint instability, sacroiliac joint insufficiency, sacroiliac joint subluxation, sciatica, SI joint instability, SI joint insufficiency, SI joint subluxation, SI joint syndrome, OR symptom-giving pelvic girdle relaxation)
AND
(antenatal, childbearing, delivery, postnatal, peripartum, postpartum, pregnancy, OR puerperium)
NOT
(infection OR neoplasm)

Table 2 Terms used (since 1900) and first paper in which they appeared

Term used (in chronological order)	First paper
Relaxation of the pelvic joints in pregnancy	[1]
Pelvic osteo-arthropathy	[118]
Insufficientia pelvis gravidarum et puerperarum	[36]
Pelvic insufficiency	[6]
Backache during pregnancy	[114]
Pelvic girdle relaxation	[101]
Pelvic arthropathy	[90]
Pelvic instability	[49]
Postpartum pelvic arthropathy	[26]
Spinal and pelvic insufficiency	[7]
Symptom-giving pelvic girdle relaxation	[25]
Pelvic pain and pelvic joint instability	[98]
Posterior pelvic pain in pregnancy vs back pain in pregnancy	[86]
Pelvic pain in pregnancy vs low back pain in pregnancy	[28]
Peripartum pelvic pain	[63]
Pregnancy-related back and pelvic pain	[10]
Back pain postpartum	[74]
Pregnancy-related pelvic joint pain	[2]
Pregnancy-related low back pain	[68]
Pregnancy-related pelvic pain	[3]
Posterior pelvic pain since pregnancy	[67]
Posterior pelvic pain after pregnancy	[65]
Lumbar back and posterior pelvic pain during pregnancy	[75]
Pregnancy-related pain in the pelvis	[116]

back pain but not in those with posterior pelvic pain [85]. Taken together, these facts appear to suggest that pregnancy-related pelvic girdle pain is distinct from low back pain.

On the other hand, Brynhildsen et al. [15] could not find any difference in long-term prognosis between sacroiliac problems and other kinds of back pain during pregnancy. Moreover, Wu et al. [116] did not find any significant difference in gait coordination between women with postpartum pelvic girdle pain and those with chronic nonspecific low back pain (cf. [47]).

If one were to adopt the distinction between pelvic girdle pain and low back pain, Östgaard's original term, "posterior pelvic pain" [85] appears to exclude pain in the area of the symphysis pubica, where pain is often reported during or after pregnancy [44, 63, 82, 85]. Moreover, the notion "pelvic pain" may be associated by many with gynecological rather than musculoskeletal problems [24], and "pain in the pelvis" could be misinterpreted in a similar way. "Pelvic joint pain" appears to solve this problem, but we do not know to what degree pain is specifically related to the joints. For now, we think that pelvic girdle pain would be most the appropriate counterpart to low back pain.

Complaints can start after delivery. Additions such as "during pregnancy", "in pregnancy", "since pregnancy", "after pregnancy", or "postpartum" are, thus, unnecessarily limiting. The adjective "peripartum" is also unsatisfactory, as it refers to the period immediately around delivery, while problems most commonly arise relatively early in pregnancy, and may remain present until a long time after delivery. In our opinion, "pregnancy-related" is most suitable, although we cannot exclude the possibility that a very similar syndrome may arise after, say, a trauma.

In citing literature that uses Östgaard's distinction, we shall use "pregnancy-related pelvic girdle pain (PPP)" for musculoskeletal problems in the pelvic region, and "pregnancy-related low back pain (PLBP)" for the lumbar region. For our present review, however, we have to take into account that the majority of the literature does not make the distinction. For this literature, we shall make use of the generic phrase "pregnancy-related lumbopelvic pain", which may refer to more than one entity. Later, we will show that pregnancy-related lumbopelvic pain encompasses PPP and PLBP, as well as their combination.

Clinical presentation

The clinical presentation of pregnancy-related lumbopelvic pain varies widely, not only among patients but also over time. Symptoms are often quite mild but occasionally, very serious. Unfortunately, only a few papers permit categorisation of patients according to the seriousness of their complaints.

Pain

Often, the onset of pain occurs around the 18th week and reaches peak intensity between the 24th and 36th week of pregnancy. Pain in the first trimester may be a

strong predictor of pain in the third (an r_P of 0.8 was reported [100]). Postpartum, PPP was reported to spontaneously disappear within 3 months in 93% of cases studied, while the 7% who did not recover turned out to be at great risk for prolonged serious pain [83].

Localisation of pain Pain is often reported to be localised (deep) in the sacral/gluteal region, lacking the typical nerve root distribution of sciatica [31, 85]. Local pain in the sacroiliac region, possibly related to the long dorsal ligaments [111], has also been reported, as has pain in the region of the symphysis pubica (e.g., [68]), and isolated or concomitant pain in the lumbar region [28, 86]. Several authors have proposed a localisation-based classification scheme [45]. Published classifications contain overlapping categories [45] or a separate subcategory for pain that is difficult to localise (such as "miscellaneous" [2], or "no pain during provocation" [74]). These facts suggest that a sharply delineated localisation of pain may be impossible. The localisation of pain may even change over time, as suggested by Kristiansson et al. [45], who described a lumbar pain that changed "toward lumbosacral and sacral pain during the course of pregnancy" (p 705).

Nature of pain Pelvic girdle pain has been described as "stabbing" [86, 103], pain in the lower back as a "dull ache", and that in the thoracic spine as "burning" [103]. In a group of pregnant women with lumbopelvic and/or thoracic pain, Hansen et al. [40] reported "shooting pain" in 80% of patients, a "feeling of oppression" in 65%, and both "a sharp twinge" and "dull pain" in 50%. We did not find any other pain-descriptors in the literature and are of the opinion that the above does not (yet) allow for any classification on the basis of the nature of the pain.

Intensity of pain During pregnancy, average pain intensity ratings are on the order of 50 mm or 60 mm on a 100 mm visual analogue scale (VAS) [45, 85], with around 20 mm as the first quartile, 50 mm the second, 75 mm the third, and the fourth somewhat above 90 mm [45]. Thus, reported pain may be mild or quite bearable in about half of the cases and very serious in about 25%. Postpartum pain is somewhat less intense than pain during pregnancy [45]. It has been reported that pain in PPP during pregnancy was more intense than pain in PLBP during pregnancy, while the reverse situation was observed postpartum [86]. In general, however, interpretation of the literature is difficult because the questions asked vary from study to study: "pain intensity at the moment" plus "worst pain felt during the last week" [45], pain not only "on average" but also during "peak episodes" [103], or "pain in the morning" and "pain in the evening"[27]. Furthermore, pain is often related to specific activities [40, 100], such as walking, or forward flexion of the trunk.

Changes in the perception and execution of movements

In view of the growing attention to problems in the perception and organisation of movement in different patient categories (e.g., [18, 112]), we decided to combine a more traditional measure of motor impairment (muscle function) with problems in the organisation of perception/action.

Muscle function Women with lumbopelvic pain during pregnancy had lower average paraspinal EMG during trunk flexion-extension than healthy pregnant women, whereas in full flexion, EMG was higher than expected [100]. Postpartum, reduced hip abduction and adduction force has been reported [67], and women who had both PPP and PLBP combined had less hip-abductor and back extensor endurance than women who had PPP or PLBP alone [75]. Mens et al. [67] hypothesised that reductions in force are not due to weakness per se, but to "pain and/or fear of getting pain" (p 1,678), suggesting that patients are more cautious. Decreased endurance of muscle groups [75] can also be linked to (fear of) pain [57, 58], while increased back muscle activity in full flexion [100] may be interpreted as "guarding" or "splinting", as has been hypothesised for low back pain (cf. [47]). At present, all these interpretations are speculative.

Changes in the perception of movement Sturesson et al. [103] found that several women (45 out of 168 with PPP) reported a "catching" sensation in their upper leg when walking. In a study by Mens et al. [64], women with PPP reported a feeling in their legs "as though they were paralyzed" (p 1,167) while performing the active straight leg-raising test. These strange feelings suggest that something unusual is going on in the nervous system when women with PPP attempt to move their leg. Interestingly, such findings have never been reported for low back pain.

Changes in movement coordination Commissaris et al. [20] observed different kinematics in women with postpartum lumbopelvic pain during a lifting task when compared with healthy controls. Patients had shorter peak flexion, used less hip flexion and more lumbar flexion at lift-off, had a larger phase lag between knee and hip extension in the upward phase, and slower completion of the upward phase of lifting. This pattern may represent a "compensatory strategy to avoid pain and/or loading of an injured spine" (p 1,288), but so far, it remains unclear why the pattern in question would be adaptive. Wu et al. [116] reported that women with postpartum PPP tended to have a significantly stronger coupling between pelvic and thoracic rotations during gait, and a larger tendency for in-phase coordination (that is, pelvic and thoracic rotations in the same

direction occur more at the same time). This may be a strategy "chosen by the nervous system to cope with motor problems" (p 685), but again, it is not clear if, and how, the above pattern protects from pain.

Disability

Patients have difficulty walking quickly and are often unable to cover large distances [31, 40, 56, 63, 75, 115, 116]. Published frequencies of disabling problems among women with lumbopelvic pain during pregnancy range from 21% to 81% (median 28%) [28, 31, 33, 82, 113]. This variance may be due to sampling bias, differences in the questions asked, or the task in question. A high frequency of problems was found for "getting up from the floor" (97%) and for sexual intercourse (82%) [40]. Several studies reported problems during sleep at night (with a considerably lower frequency, around 30% [31, 32, 35, 78]). To further study disability, there is an urgent need for the use of standardised questionnaires [43, 65, 66, 68, 88, 100]. Padua et al. [88] used such an instrument, the Roland Disability Questionnaire (RDQ), and found that 31% of women with lumbopelvic pain during pregnancy scored 0 points; 40%, 1–4 points; 21%, 5–10 points; and 8% more than 10 points on this 24-point scale ("0" = no disability, "24" = maximum possible disability). It was concluded that most women with lumbopelvic pain during pregnancy have no more than mild disability [88]. Still, 8% were found to be severely disabled.

Among members of a patient association with postpartum lumbopelvic pain [63], high frequencies of problems were found for "standing 30 min" (90%) and for sexual intercourse (68%). In another patient association [56], the most problematic activities (in descending order) were housework, exercise, activities with the children, employment, leisure/hobbies, and personal relationships or married life. When at their worst, the problems had required the use of crutches (64%), a wheelchair (14%), cushions (8%), a walking frame (5%), or a walking stick (3%). We found one study on postpartum disability, by Norén et al. [75], that did not suffer from the selection bias of relying on members of a patient association only. Of the 173 women with PPP and/or PLBP in the preceding ("index") pregnancy, 41 (24%) still had pain at 3-year follow-up. The authors used a 100 mm VAS for the "difficulty" to do housework, walk more than 20 min, or do exercise. The women who at the time of the study suffered from both PPP and PLBP combined, reported on average 50 mm for these activities, while difficulties were less for the women with PPP alone (37 mm, 21 mm, and 32 mm, respectively), and least in those with only PLBP (17 mm, 1 mm, and 15 mm).

Prevalence and risk factors

Prevalence is expressed as relative frequency of complaints among pregnant women (or women postpartum). "Period prevalence" refers to complaints at any time during pregnancy (and, possibly, a few months thereafter), and "point prevalence" to complaints at the time of measurement [80, 82]. In our analysis, we focused on the prevalence of lumbopelvic pain ("mixed" in our Tables), PPP, and/or PLBP, during or after pregnancy.

Prevalence during pregnancy

We found 32 papers with information on prevalence during pregnancy. However, several of these papers contained potentially biased estimates of prevalence. Three studies gave the number of patients treated for PPP by the head of the department, divided by the total number of pregnant women who had reported to the clinic. This procedure selected serious cases only and will have led to a considerable underestimation of the prevalence of complaints (0.8% [118], 0.8% [36], and 0.2% [29]). Another study [16] recruited volunteers in the waiting room of a maternity clinic, which may easily have led to overestimation (88.2% [16]). We decided to omit these four papers. This left us with 28 studies (Table 3) and a total of 41 prevalence values. Average published prevalence was 45.3%, with large variation (range 3.9–89.9%, median 49.0%).

We classified studies according to:

1. Year of publication
2. Study type: retrospective/prospective
3. Culture: Western/non-Western
4. Diagnosis: PPP/PLBP/both/mixed
5. Report: self-report by the patient/diagnosis by a doctor
6. Sample size
7. Inclusion/exclusion of patients with previous low back pain at the time of enrolling subjects
8. Inclusion/exclusion of high back pain (thoracic and/or cervical pain) in the prevalence estimate
9. Point/period calculation of prevalence

We replaced all subclasses of categorical variables (such as prospective/retrospective) by integers (0, 1, etc., giving the highest number to the subclass corresponding to the highest prevalence). Then, we correlated each of the variables with prevalence, and established the P value of the correlation (Table 4). We identified the variables with P values of 0.1 or less. These were: diagnosis, report, sample size, and high back pain. Finally, we entered these latter variables into multiple regression analysis. We obtained a highly significant linear model ($F_{4,36} = 12.7$; $P < 0.0001$,

Table 3 Prevalence of lumbopelvic pain during pregnancy (*Pro* prospective, *Retro* retrospective, *W* Western, *N-W*non-Western, *PPP* pregnancy-related pelvic girdle pain, *PLBP* pregnancy-related low back pain, *Both* PPP and PLBP combined, *Mixed* not specified ("lumbopelvic pain"), *D* doctor's, *P* patient's, *LBP* low back pain, *In* included, *Ex* excluded, *HBP* high back pain)

Reference	Year	Study	Culture	Diagnosis	Report	*n*	Previous LBP	HBP	Point/period	Prevalence (%)
[2]	2000	Pro	W	PPP	D	2,269	In	Ex	Point	23.6
[3]	2001	Pro	W	PPP	D	1,789	In	Ex	Point	22.6
[7]	1988	Pro	W	Mixed	P	862	In	Ex	Period	49.0
[9]	2000	Pro	W	Mixed	P	49	In	In	Period	49.0
[9]	2000	Pro	N-W	Mixed	P	303	In	In	Period	66.0
[9]	2000	Retro	N-W	Mixed	P	251	In	In	Period	81.0
[9]	2000	Retro	W	Mixed	P	149	In	In	Period	77.0
[28]	1995	Retro	W	PPP	P	5,215	In	Ex	Period	42.4
[30]	1952	Pro	W	Mixed	D	131	Ex	Ex	Period	55.7
[31]	1987	Retro	W	Mixed	P	200	In	Ex	Period	56.0
[32]	1989	Pro	W	Mixed	P	100	In	In	Period	76.5
[33]	1990	Pro	W	Mixed	P	164	In	Ex	Point	58.5
[35]	1993	Retro	N-W	Mixed	P	200	In	Ex	Period	54.5
[42]	2001	Pro	W	Mixed	P	357	In	Ex	Period	51.5
[42]	2001	Pro	W	Mixed	P	357	In	In	Period	79.0
[45]	1996	Pro	W	Mixed	D	195	In	In	Period	76.4
[48]	1999	Pro	W	PPP	D	1,600	In	Ex	Period	14.2
[51]	1995	Retro	W	Mixed	P	329	Ex	Ex	Period	34.7
[59]	1977	Retro	W	Mixed	P	180	In	In	Period	48.0
[61]	1989	Retro	W	Mixed	P	114	In	Ex	Period	58.0
[75]	2002	Pro	W	Mixed	P	799	In	Ex	Period	28.9
[76]	1982	Retro	N-W	Mixed	P	99	In	In	Period	89.9
[78]	1994	Pro	W	Mixed	P	449	In	Ex	Period	54.8
[82]	1991	Pro	W	Mixed	P	855	In	In	Period	49.0*
[84]	1994	Pro	W	PPP	D	362	In	Ex	Period	31.2
[84]	1994	Pro	W	PLBP	D	362	In	In	Period	7.8
[84]	1994	Pro	W	Mixed	D	362	In	In	Period	47.0
[84]	1994	Pro	W	Both	D	362	In	In	Period	8.0
[86]	1996	Pro	W	PPP	D	368	In	Ex	Period	34.0
[86]	1996	Pro	W	PLBP	D	368	In	In	Period	11.0
[86]	1996	Pro	W	Mixed	D	368	In	In	Period	44.6
[88]	2002	Pro	W	Mixed	P	76	In	Ex	Period	69.7
[96]	1996	Retro	W	Mixed	P	450	In	In	Period	51.1
[103]	1997	Pro	W	Mixed	P	338	In	In	Point	51.0
[103]	1997	Pro	W	PPP	D	338	In	In	Point	36.2
[105]	1990	Retro	W	Mixed	P	1,502	In	Ex	Period	24.0
[110]	1999	Pro	N-W	PPP	D	509	In	Ex	Point	3.9
[110]	1999	Pro	N-W	PLBP	D	509	In	Ex	Point	38.0
[113]	1998	Retro	W	PPP	P	3,074	In	Ex	Period	9.8
[113]	1998	Retro	W	PLBP	P	3,074	In	Ex	Period	37.4
[113]	1998	Retro	W	Mixed	P	3,074	In	Ex	Period	55.1

* In this study, 22% of the women who had entered had ongoing low back pain; the incidence, therefore, equals 27%

Table 5), which explained 58.5% of the variance of prevalence during pregnancy. The model gave diagnosis and high back pain as factors that significantly affect prevalence.

Table 4 Correlations with published prevalence during pregnancy (*PLBP* pregnancy-related low back pain, *PPP* pregnancy-related pelvic girdle pain, *Mixed* "lumbopelvic pain" without further specification)

Variable	Pearson correlation	*P* value
Diagnosis (both/PLBP/PPP/mixed)	0.69	< 0.0001
Report (doctor's/patient's)	0.52	0.0004
Sample size	−0.32	0.04
High back pain (excluded/included)	0.30	0.06
Year of publication	−0.17	0.30
Point/period	0.25	0.12
Study (prospective/retrospective)	0.20	0.21
Culture (Western/non-Western)	0.20	0.22
Previous low back pain (included/excluded)	0.01	1.00

Postpartum prevalence

We found 18 papers [3, 13, 17, 19, 22, 38, 42, 43, 45, 51, 52, 53, 69, 75, 81, 95, 96, 108] on postpartum prevalence,

Table 5 Factors with a significant impact on prevalence during pregnancy (*SE* standard error, *PLBP* pregnancy-related low back pain, *PPP* pregnancy-related pelvic girdle pain, *Mixed* "lumbopelvic pain" without further specification)

Variable	Coefficient (SE)		*P* value
Diagnosis (both/PLBP/PPP/mixed)	14.3	(4.1)	0.001
High back pain (excluded/included)	10.7	(5.2)	0.045

giving a total of 100 prevalence values (a table can be obtained from the authors). We did not find any indications of systematically biased estimation. Average published postpartum prevalence was 24.7%, again with large variation (range 0.3–67.0%, median 21.6%).

In principle, we used the same nine variables as for prevalence during pregnancy, but added:

10. Inclusion/exclusion of PPP and/or PLBP during the previous pregnancy
11. Epidural anaesthesia: yes/no/mixed
12. Caesarean section: excluded/included
13. Multiple parity: excluded/included
14. Week postpartum

Moreover, we omitted culture because all studies were Western. As to the inclusion/exclusion of patients with previous low back pain at the time of enrolling subjects, we further applied the criterion of whether patients with previous LBP were included in the prevalence estimate or not. Finally, we changed point vs period prevalence into "pain just now" vs pain that had lasted for some time.

In our analysis, we followed the same procedure as for prevalence during pregnancy. The *P* value of the correlation with prevalence (Table 6) was 0.1 or less for: previous low back pain, PPP and/or PLBP during the preceding pregnancy, report, diagnosis, and pain just now vs pain that had lasted for some time. Using multiple regression analysis (Table 7), we obtained a highly significant linear model ($F_{5,94} = 20.1$; $P < 0.0001$), which explained 56.2% of the variance, and identified previous LBP, report, and pain just now/pain that had lasted for some time as significantly contributing factors.

Table 7 Factors with a significant impact on postpartum prevalence (*SE* standard error)

Variable	Coefficient (SE)		*P* value
Previous LBP (as in Table 6)	12.9	(2.5)	< 0.0001
Report (doctor's/patient's)	21.3	(6.3)	0.001
Pain (just now/lasting for some time)	5.4	(2.6)	0.044

Risk factors

In our analysis of the literature on the association between possible causal factors (risk factors) and the occurrence of pregnancy-related lumbopelvic pain, only cohort studies, case control studies, and prevalence studies were included [12]. We identified 34 relevant studies with correlations, regression coefficients, or, for instance, odds ratios (Table 8). Some of these studies were also used in our prevalence analysis.

A total of 15 possible risk factors could be identified. If a study was concerned with complaints that started during pregnancy as well as complaints starting postpartum, we used it twice. We extracted significant associations. In Table 8, we interpret the overall pattern according to the following scheme:

1. *Strong evidence*—at least ten studies published, with at least half of these pointing significantly to a particular factor, and no study contradicting this result
2. *Weak evidence*—one or both of the positive criteria for strong evidence was not fulfilled, but at least one study reported a significant influence, and no study contradicted this result
3. *Conflicting evidence*—in at least one pair of studies significant results contradicted each other

Table 6 Correlations with published postpartum prevalence ((*PLBP* pregnancy-related low back pain, *PPP* pregnancy-related pelvic girdle pain,*LBP* low back pain)

Variable	Pearson correlation	*P* value
Previous LBP (included in the population but excluded in the prevalence estimate/excluded from population/ included in prevalence estimate)	0.59	< 0.0001
Lumbopelvic pain during the preceding pregnancy (included/excluded)	0.52	< 0.0001
Report (doctor's/patient's)	0.30	0.002
Diagnosis (both/PLBP/PPP/mixed)	0.26	0.01
Pain just now/lasting for some time	0.17	0.09
Study (prospective/retrospective)	0.16	0.12
Sample size	−0.12	0.26
Epidural anaesthesia (yes/no/mixed)	0.10	0.34
Year of publication	−0.10	0.34
Week postpartum	−0.09	0.40
High back pain (included/excluded)	0.07	0.52
Multiparity (included/excluded)	0.01	0.93
Caesarean section (included/excluded)	0.01	0.94

Table 8 Risk factors for lumbopelvic pain during (DP) and after (AP) pregnancy

Factor	x/y[a]	Evidence	Outcomes[b]	References	Confounders
Maternal age	11/23	Conflicting	DP: younger	[28, 80, 82, 83]	Parity [59, 76]
			DP: older	[59, 76[d]]	
			DP: no effect	[31, 35,45, 48, 60, 61, 76[e], 78, 107]	
			AP: younger	[13[f], 53, 81, 95, 109]	
			AP: no effect	[13[g], 17, 96]	
Number of pregnancies	11/21	Conflicting	DP: higher	[23, 28, 45, 59, 76[d], 82]	–
			DP: no effect	[7, 31, 35, 48, 61, 76[e], 78, 80, 107]	
			AP: lower	[53, 108]	
			AP: higher	[17, 81, 109]	
			AP: no effect	[96]	
Maternal height	1/8	Weak	DP: no effect	[35, 48, 59, 61, 78, 82, 99]	Maternal weight [13]
			AP: shorter	[13][g]	
Maternal weight	5/16	Weak	DP: heavier	[23, 28, 45, 78[h]]	–
			DP: no effect	[31, 35, 48, 59, 61, 78, 82, 99]	
			AP: heavier	[13][f, g]	
			AP: no effect	[17, 95, 96]	
Foetal weight	2/10	Weak	DP: heavier	[28[i], 99]	–
			DP: no effect	[31, 35, 59, 61, 83, 95]	
			AP: no effect	[13[g], 95, 96]	
Maternal ethnicity	3/5	Conflicting	DP: Caucasian	[31]	–
			DP: Sephardic	[78]	
			AP: Asian	[53]	
			AP: no effect	[95, 96]	
Maternal bone density	0/1	No	DP: no effect	[10]	–
Oral contraceptives	1/4	Weak	DP: no effect	[7, 11, 82]	–
			AP: short term use	[11]	
Smoking	2/5	Weak	DP: yes	[7, 28]	Strenuous work [7]
			DP: no effect	[45, 48, 99]	
Strenuous work	8/12	Strong	DP: yes	[7, 19, 28, 35, 82]	–
			DP: no effect	[15, 48]	
			AP: yes	[15, 53, 81]	
			AP: no effect	[19, 109]	
Previous low back pain (in four of the studies related to menstruation)	12/18	Strong	DP: yes	[35, 45[j], 48, 61, 78, 80, 82]	–
			DP: no effect	[7, 11, 45[k], 61, 107]	
			AP: yes	[11, 13, 81, 96, 109]	
			AP: no effect	[17]	
Previous lumbopelvic pain during or after pregnancy	11/12	Strong	DP: yes	[7, 11, 15, 23, 45[j], 48, 78, 83]	–
			DP: no effect	[45[k]]	
			AP: yes	[11, 15, 81]	
Previous abortion	0/2	No	DP: no effect	[35, 78]	–
Epidural anaesthesia	2/11	Weak	DP[c]: no effect	[78]	–
			AP: yes	[53, 95]	
			AP: no effect	[13[g], 17, 43, 51, 52, 69, 96, 108]	
Prolonged second stage of labour	1/5	Weak	AP: yes	[53]	Traumatic labour [63]
			AP: no effect	[13, 17, 95, 96]	

[a] x/y: x out of the y relevant studies revealed an association
[b] Terms such as "older" identify the risk factor in question. Note that we focused on significance: an "effect" implies that a significant relationship was found, "no effect" that no significant relationship was found
[c] Refers to subsequent pregnancy
[d] For the first and second pregnancies
[e] For the second pregnancy only
[f] Including cases where "low back pain" had been present before or during pregnancy
[g] Excluding such cases (cf., footnote f)
[h] For nulliparous women
[i] A very small partial regression : $r = 0.0001$
[j] For the continuation of pain that already existed
[k] For new-onset pain

4. *No evidence*—the factor in question was studied, but no significant association was found.

From Table 8, one can see that there is strong evidence that strenuous work, previous low back pain, and previous PPP are risk factors for pregnancy-related lumbopelvic pain. Moreover, weak evidence was found for maternal height, maternal weight, foetal weight, the use of oral contraceptives, smoking, epidural anaesthesia, and a prolonged second stage of labour. Finally, the evidence for maternal age, number of pregnancies, and maternal ethnicity was conflicting. No evidence was found for maternal bone density and for previous abortion. We will further analyse these results in the discussion below.

Discussion

In clinical practice, as well as the scientific literature, pregnancy-related lumbopelvic pain is embedded in uncertainty, and even doubt [72]. It has been regarded as a "hysterical epidemic" [92], a normal discomfort of pregnancy [1, 31, 78, 97], or a severely disabling problem [15, 36, 102, 118]. Certainly, this divergence of opinions is related to the fact that the condition was, and in many ways still is, difficult to grasp scientifically.

From our present review of terminology, clinical presentation, and prevalence (plus risk factors), it is clear that considerable knowledge has been gained in recent decades. Still, there is no commonly accepted terminology; it remains difficult to precisely delineate the clinical picture, and there is a wide range of published prevalence values.

Limitations of the present review

Since so many terms are used to capture pregnancy-related lumbopelvic pain, we cannot be sure that our list of search terms covered all relevant papers. Moreover, we only searched in MEDLINE, could not locate some papers, primarily looked for English publications, and discarded papers that in our opinion contained no original information. Thus [21], we may still have missed some pertinent information.

Prevalence

Because the analysis of prevalence, as well as that of the clinical picture, has an impact on our understanding of terminology, we have reversed the order of presentation in our discussion section, and begin with prevalence first.

From our raw data, we found an average published prevalence of about 45% during pregnancy and 25% after pregnancy, both with a wide range. Multivariate analysis, as we used, has important drawbacks. If factors are strongly correlated, the resulting model will select only one of them. Moreover, the models assume linearity, which is often not realistic. Finally, multivariate analysis is sensitive to small deviations in the data, and thus to sampling error. Nevertheless, multivariate analysis is a powerful tool to identify factors that co-determine prevalence. We will first analyse the impact of the separate factors that were identified by multivariate analysis, recalculating average published prevalence for each subcategory as if it were the only relevant factor. Later, we will attempt to formulate an overall estimate that combines all relevant factors.

For prevalence during pregnancy, the model gave a significant effect of diagnosis. The sum of the prevalences of PPP, PLBP, and "PPP plus PLBP combined" equalled a number ($24.2\% + 23.6\% + 8.0\% = 55.8\%$) that was very close to that of lumbopelvic pain (mixed, 56.9%). This fact remained unchanged (58.2% for mixed) when we recalculated prevalence after excluding papers that simultaneously used all four diagnostic categories in the same study [85, 86, 103, 113]. We conclude that PPP during pregnancy can be distinguished effectively from PLBP. Nevertheless, no comparable pattern appeared for prevalence postpartum ($3.4\% + 1.6\% + 1.1\% \neq 25.9\%$, the prevalence of "mixed" being off by about 20%). In the postpartum literature, however, diagnosis correlated strongly with report ($r_P = 0.69$; $P < 0.0001$), while studies that distinguished between PPP and PLBP used doctors' reports only. On average, doctors' reports give about 20% lower prevalence than patients' reports (see below). When corrected for this difference, we find exactly the same pattern as during pregnancy.

We conclude that pregnancy-related lumbopelvic pain = PPP + PLBP + "PPP and PLBP combined". PPP comprises around half of all pregnancy-related lumbopelvic pain (a bit less during and more after pregnancy), PLBP about one-third (a bit more during and less after pregnancy), and the two conditions combined, about one-sixth.

The impact of report in the postpartum literature was considerable: a prevalence of 6.2% for doctors' reports, and 26.3% for patients' reports. This difference is on the order of 20%. In the literature on the during-pregnancy period, report appeared as a significant factor in the correlation analysis, but was not selected in the multivariate model because of its significant correlation with diagnosis ($r_P = 0.57$; $P < 0.0001$). During pregnancy, average prevalence was 30.3% for doctors' reports, and 53.9% for patients', again with a difference on the order of 20%. Thus, report had a similar impact on prevalence during pregnancy as after pregnancy.

A plausible explanation of the difference between doctors' and patients' reports is that patients are often asked about symptoms in questionnaires. Thus, they will also report mild pain that normally would not lead them to seek medical help. In comparison, the doctor may diagnose symptoms only if they are sufficiently serious to warrant medical help. Hence, we interpret the 20% difference between patients' and doctors' reports as the prevalence of mild pain.

Recall that the total published prevalence of lumbopelvic pain during pregnancy was around 45%, and 25% after pregnancy. We now find that 20% of all relevant women have a lumbopelvic pain that can be regarded as a normal discomfort of pregnancy. Thus, around 25% (= 45%–20%) of all pregnant women, and around 5% (= 25%–20%) of all women postpartum suffer from lumbopelvic pain that is sufficiently serious to require medical help.

The third factor, from the postpartum prevalence literature, was previous low back pain. If women with a history of low back pain were excluded, average prevalence of lumbopelvic pain after pregnancy was 24.3%. When they were included, prevalence was 42.7%, of which one-quarter was new onset and three-quarters had a history of low back pain. This latter ratio implies that previous low back pain leads to a threefold increase of the risk to develop lumbopelvic pain after pregnancy. The during-pregnancy literature, however, failed to confirm an effect of previous low back pain: 45.2% for women without, and 45.3% for women with previous low back pain. Still, only two studies [30, 51] excluded previous low back pain (Table 3), which appears to suggest the possibility of sampling bias. Interestingly, in the risk-factors literature (Table 8), five out of six studies (83%) found an effect of previous low back pain on lumbopelvic pain after pregnancy. Results were similar in only seven out of 12 studies (58%) during pregnancy. Clearly, the risk-factors literature suggests an impact of previous low back pain on pregnancy-related lumbopelvic pain. Although we do not know why, this impact may be greater after than it is during pregnancy.

We propose taking the combined evidence from the postpartum-prevalence literature and the risk-factors literature to conclude that previous low back pain considerably increases the risk of pregnancy-related lumbopelvic pain, especially postpartum. In the prevalence literature, two other factors were significant. Prevalence during pregnancy was higher if high back pain was included. Postpartum, prevalence was higher for pain just now than for pain lasting for some time. We regard both these effects as trivial.

Risk factors

In our analysis of risk factors (Table 8), there was strong evidence for strenuous work, previous low back pain, and previous lumbopelvic pain during or after pregnancy. Strenuous work was not a category in the prevalence literature, while previous low back pain was associated with postpartum prevalence. Previous lumbopelvic pain during or after pregnancy came to the fore in the correlation analysis of postpartum prevalence but not in the multivariate model, since it was strongly correlated with previous low back pain ($r_P = 0.81$; $P < 0.0001$). All in all, we may safely conclude that strenuous work, previous low back pain, and previous lumbopelvic pain during or after pregnancy are risk factors for developing lumbopelvic pain during or after a new pregnancy.

It is attractive to explain the influence of these three factors by invoking previous tissue damage. This, however, would be a speculative interpretation. A psychological explanation or, for instance, an interaction between different kinds of factors, cannot be excluded.

Weak evidence (Table 8) was found for the following risk factors: Maternal height (shorter), maternal weight (heavier), foetal weight (heavier), the use of oral contraceptives (recent start), smoking, epidural anaesthesia, and a prolonged second stage of labour.

In line with our interpretation in terms of tissue damage, an effect of being both short and heavy (as in [13]), having a heavy baby, or of a prolonged second stage of labour (possibly, traumatic labour [63]), is not surprising. Nor is an effect of smoking, which may also be related to strenuous work [7].

As to the use of oral contraceptives, the situation is more confusing. Because of the effects of hormones on nociception [103], many have expressed their concern about the possible role of oral contraceptives in causing lumbopelvic pain (e.g., [14]). The three studies on lumbopelvic pain during pregnancy (Table 8), however, did not find such an effect. To the contrary, Björklund et al. [11] found that those who had recently started using contraceptives had a higher risk for postpartum lumbopelvic pain than did long-term users. Although this is an isolated observation, it is potentially interesting, because it would suggest a protective, rather than a harmful effect of oral contraception, at least in the postpartum situation. Again, we do not know why such an effect (if it exists) would reveal itself after pregnancy only.

Theoretically, we do not have any difficulties with epidural anaesthesia being a risk factor for lumbopelvic pain postpartum, since it can be linked to tissue damage. The issue has drawn a significant amount of attention in the literature. Of the two authors who found epidural anaesthesia to be a risk factor, one [95] later came to the conclusion that the relationship between epidural anaesthesia and subsequent lumbopelvic pain did not exist [93], while the other [53] persisted [54]. The conflict can be resolved if one considers the statistical principles involved. When two out of 11 studies find a significant effect, while the other nine do not, the most plausible explanation is that an effect exists, but it is so small that it usually does not lead to significance.

The evidence for three risk factors was conflicting—maternal age, number of pregnancies, and maternal ethnicity (Table 8). For maternal age, nine studies suggested a higher risk in younger women, two, a higher risk for older women, and 12, no effect. For number of pregnancies, two gave a higher risk for the first pregnancies, nine, a higher risk during later pregnancies, and ten, no effect. We suspect that maternal age and number of pregnancies are confounded [59, 63]. Moreover, it is highly plausible that the real pattern of associations has a U-form. First, there is a relatively high risk for very young women, or the first pregnancy (because the system is not yet used to, or ready for pregnancy). Then, the

risk decreases. Finally, however, it goes up again, for much older women, or much later pregnancies (because there is a higher risk of preceding tissue damage). Of course, this idea of a U-curve is speculative. It is, however, theoretically attractive and consistent with published studies.

As to the effect of maternal ethnicity in the prevalence literature, no effect of culture was found during pregnancy, and studies on postpartum prevalence were performed in Western culture only. With respect to the risk-factors literature, evidence was conflicting. In two studies [95, 97], no effect of ethnicity was found, but in others, prevalence was reported to be relatively high in Caucasians [31], in women of Sephardic origin [78], or Asians [53]. Given our analysis of prevalence during pregnancy, and the fact that pregnancy-related lumbopelvic pain has been reported from many countries—in Africa [9, 76, 110], the Americas [27, 31], Asia [35, 70, 104, 109], Australia [16], and Europe [2, 28, 59, 68, 85, 88, 100]—we propose concluding that the few cases in which a relationship was found occurred by chance, and that, actually, maternal ethnicity is not a risk factor.

The latter conclusion, plus the fact that there was no effect of ''year'' in the prevalence literature, underlines, once more, that pregnancy-related lumbopelvic pain is a legitimate condition that occurs in all countries and at all times.

Overall interpretation of prevalence and risk factors

If, indeed, pregnancy-related lumbopelvic pain is a legitimate condition, rather than, for instance, an ''hysterical epidemic'' [92], why, then, are published prevalence values and the results of risk factor analysis so widely different? We found several important factors that can explain the confusion in the literature.

First, the diagnosis has a large impact on prevalence. For instance, we found very different numbers for PLBP during pregnancy, PPP during pregnancy, both conditions combined, and the mixed category of lumbopelvic pain during pregnancy. We showed that the problem of the differences between these numbers can be resolved, more or less completely, by assuming that ''lumbopelvic pain'' = PPP + PLBP + ''PPP and PLBP combined''.

Second, different values have to be expected if one focuses on lumbopelvic pain that warrants medical help (leading the patient to seek such help, or the doctor to diagnose pain), rather than using questionnaires (which do not specify the seriousness of the symptoms). Both during and after pregnancy, the prevalence of lumbopelvic pain is about 20% lower if one excludes mild pain that does not require medical attention. Obviously, and we will discuss that under ''clinical presentation'', differences will become even bigger if one focuses on patients with serious pain, or patients with severe disability only.

Third, there are factors that predispose for pregnancy-related lumbopelvic pain: strenuous work, previous low back pain, and previous lumbopelvic pain during or after pregnancy. Other factors appear to have a weak impact. The one factor for which we made a quantitative analysis, the impact of previous low back pain on lumbopelvic pain postpartum, gave a threefold increase of the risk. Clearly, the decision to include/exclude particular groups of subjects can have a major effect on published prevalence.

Taken together, the above allows us to formulate rough estimates for ''true'' prevalence. About 45% of all pregnant women have at least some lumbopelvic pain during pregnancy, and around one-fourth have it postpartum. If one removes patients with mild pain only, thus focusing on patients who seek medical help, or who would be diagnosed by their doctor as being in pain, the overall prevalence goes down by about 20%, leaving around 25% of pregnant women who need help for lumbopelvic pain, and 5% of all women postpartum. These numbers will be higher among women with strenuous work, previous low back pain (at least, for the postpartum situation), and previous lumbopelvic pain during or after pregnancy. On the order of one-half of patients with pregnancy-related lumbopelvic pain can be diagnosed as having ''pregnancy-related pelvic girdle pain (PPP)'', one-third as ''pregnancy-related low back pain (PLBP)'', and one sixth as suffering from both conditions combined. Clearly, PPP and PLBP present very important medical problems, to be taken seriously in practice as well as research.

Clinical presentation

It is clear that the symptoms of pregnancy-related lumbopelvic pain are often mild, but can be quite serious. The intensity of pain during pregnancy is on average on the order of 50 mm or 60 mm on a 100 mm VAS, which is not extreme, but higher than the average score among patients seeking help for back pain in a back pain clinic. From the literature, no single characteristic of the pain turned out to be consistent (it is not always deep in the gluteal region; it is not always of a stabbing nature).

Scattered over the literature, one finds descriptions of changes in muscle activity. The current tendency is to interpret these in terms of being cautious, or even fearful. In and of itself, these are attractive ideas, but so far, hard evidence is lacking. In our opinion, the most intriguing finding is that women with PPP report a ''catching'' feeling in their legs when walking [103], and a feeling ''as though they were paralyzed'' during an active straight-leg raising task [64]. Such observations have never been reported in studies on low back pain of any kind. Hence, we propose to conclude that PPP and PLBP are indeed distinct entities, although, of course,

similar mechanisms may be involved. The ''catching'' feeling in the leg may reveal a problem of proprioception and motor control/coordination. Motor coordination was found to be altered in women with PPP postpartum [116], in subjects with lumbopelvic pain after pregnancy [20], as well as in subjects with sacroiliac problems not specifically related to pregnancy [71, 87].

Women with PPP may be disabled. Unfortunately, few studies have analysed the nature of the disabilities, or the underlying mechanisms. Even as to gait, which has been studied repeatedly in uncomplicated pregnancies [5, 8, 34, 37, 73, 77, 106], only one paper has been published on gait changes in women with PPP [116]. This study reported a tendency of keeping horizontal pelvic and thoracic rotations in-phase (as in subjects with chronic nonspecific low back pain [47]). Further analysis of disabilities in women with PPP constitutes an important research priority.

The distribution of mild, moderate, and serious complaints

It was reported that 25% of all patients with lumbopelvic pain during pregnancy have very serious pain [45], while about 8% have severe disability [88]. Thus, of all women with lumbopelvic pain during pregnancy, 45% have ''mild'' complaints only (cf., our analysis of doctors' vs patients' reports), 25% have ''serious'' complaints (or 8% if one considers severe disability rather than very serious pain), leaving 30% (or 47%) for ''moderate'' complaints. Of women with lumbopelvic pain after pregnancy, 80% have mild complaints only, and 7% have serious problems [83], leaving 13% for moderate complaints.

Terminology

Our review revealed that there exists a bewildering multitude of terms for pregnancy-related lumbopelvic pain.

We reject the use of terms that hint at a pathological mechanism as long as the pathology of PPP remains unknown. Moreover, many of the terms used in the literature are unnecessarily limiting as to the localisation (such as posterior) or the time (such as peripartum) of the pain. Instead, we opt for the terms pregnancy-related pelvic girdle pain (PPP) and pregnancy-related low back pain (PLBP).

In our analysis of terminology, we presented published evidence that PPP is distinct from PLBP, but their prognosis did not appear to be different [15], and gait coordination in PPP was similar to that in chronic low back pain [116]. Still, under ''clinical presentation'' we came across a symptom (a ''catching'' or ''paralysed'' feeling in the leg) which appears to be unique to PPP. Moreover, the posterior pelvic pain provocation (PPPP) test [84] elicits pain deep in the gluteal region, which is also unique to PPP (diagnosis will be extensively addressed in our second review). Finally, our quantitative analysis of the prevalence literature led us to conclude that ''pregnancy-related lumbopelvic pain'' = PPP + PLBP + ''PPP and PLBP combined''. Thus, the term ''pregnancy-related lumbopelvic pain'' is a vehicle only, serving to characterize literature where the distinction between PPP and PLBP is not made, whereas in fact it can and should be made.

Given that PPP is a fairly common affliction and symptoms are sometimes seriously disabling, it is clear that reaching consensus on terminology will be of great importance. Lack of consensus on terminology hinders research, as our review itself testifies. We cannot even be sure that our list of search terms was complete. More important, without consensus on terminology, one has to expect that doctors are reluctant to formulate an explicit diagnosis, and are thus uncertain as to the choice of treatment. This state of affairs can be a source of great anxiety for the patients, who may even come to fear that some doctors (or relevant others) do not take their problems seriously.

Conclusions

During and after pregnancy, women often have pain in the pelvic girdle and/or the lower back. There is no consensus, yet, on the terminology to capture these problems. Consensus would help the scientific community, the doctors, and the patients. In the present review, we opted for ''pregnancy-related pelvic girdle pain'' (PPP) vs ''pregnancy-related low back pain (PLBP)''. There is evidence that the two can be distinguished diagnostically, and are, in fact, different entities.

Of women with PPP and/or PLBP during pregnancy, around 45% have mild symptoms only; 25% are in very serious pain; and 8% are severely disabled. Of women with PPP and/or PLBP postpartum, around 80% have mild symptoms, and 7% have serious problems. The localisation and the nature of the pain vary. Changes in muscle activity have been observed, as well as an unusual perception of the leg when the patient tries to move it, and changes in motor coordination. Theoretical interpretations of these phenomena remain speculative. Thus, there is an urgent need to analyse the nature and causation of disabilities in PPP.

Published prevalence values for PPP and/or PLBP vary widely. These differences can be understood, first, on the basis of the diagnosis used: about half of the cases are PPP; about one-third are PLBP and one-sixth are both combined, while together they all form an

unspecified ''mixed'' group. Second, the inclusion of mild complaints increases prevalence with about 20%. Third, the inclusion or exclusion of subgroups with particular risk factors will affect the prevalence value; for previous low back pain, for instance, a threefold increase of the risk to develop PPP and/or PLBP was found.

Taken together, these facts reveal that PPP is a legitimate condition, of all countries at all times, which deserves serious attention from the medical and scientific communities.

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